Horseshoe Crab Spawning Activity Analysis Program

User's Manual

February 2006

Written and Developed by
Doug Nichols
USGS - Leetown Science Center
Aquatic Ecology Laboratory
11649 Leetown Road
Kearneysville, WV 25430

Table of Contents

1.0 Program Description

The Horseshoe Crab Spawning Activity Analysis Program is designed to serve as a means of viewing results from the Delaware Bay Horseshoe Crab Spawning Survey. It is an interactive program that allows the user to choose the type of data that is of the most interest. Data is displayed in both a table format and in a graph format, both which can be saved. Spawning data is broken into the following categories:

- Beach calculations by Year
- State calculations by Year
- Bay-wide calculations by Year
- State calculations by Lunar Period
- Bay-wide calculations by Lunar Period

There is also a quick look-up feature that allows the user to select a location and a time period and quickly receive the information needed.

This program is a stand-alone program that runs on standard IBM PC-compatible computers operating under Windows XP. No additional software is required. The program was developed using Microsoft Visual Basic 6.0. Data is stored in two Microsoft Access databases, one housing the raw data and another housing the calculation results that are available in the form of tables and graphs. Please do not edit any information in the database, as it will affect the results shown in the graphs and tables.

2.0 Installing and Uninstalling the Program

2.1 Running the Setup.exe installation file

Before installing the Horseshoe Crab Spawning Activity Analysis Program, it is important to close any running applications. If other applications are running, it may interfere with the installation of this program. To install the program, download the .zip file from the Horseshoe Crab Monitoring Web Site (http://www.lsc.usgs.gov/aeb/2065/) and unzip the contents of the file. Run the setup.exe and follow the on screen instructions.

The installation program will prompt you for a directory in which to install the program. You can choose the default directory, or navigate to a directory of your choice. You may be asked to give the program a name. By default, the program name is SPAWNAR. Either keep the default name, or rename it to a name of your choice. The program will then begin the process of installing the program to the location that you specified. This process may take several minutes to complete. If you receive a message that certain applications are in use that may affect the installation of a certain file, exit the installation and close any other applications that may be running.

After installation is complete, you can run the program by going to **Start → Programs → SPAWNAR** (or the name that you chose). To create a link to the program from you desktop, drag the Striped Bass Program icon from the programs menu to the desktop.

2.2 Alternative Method for Installing the Program -- Copying the Horseshoe Crab Application file to your computer

If errors are encountered during installation, and the program cannot be installed onto your PC, the program executable file and the database is included in the executable file on your CD. Simply copy the program executable (named "HorseshoeCrab.exe") and the two databases (named "BeachSurvey.mdb" and "Calculations.mdb" to a folder of your choice on you computer. To run the program, double click the "HorseshoeCrab.exe" icon. This only needs to be done if the instructions in section 2.1 failed to correctly install the program.

2.3 Uninstalling the Program

To uninstall the program, go to **Start → Settings→ Control Panel** from your Windows desktop. From the control panel, select Add/Remove Programs. Scroll through the list and find the name of this program (by default, the program was named SPAWNAR). Select this item, and then select the Add/Remove Button. This will uninstall the program from your computer. Before uninstalling, make sure that you have backups of all of your important data because database files will be deleted during this process.

3.0 Navigating the program

3.1 Starting the Program

To open the program, go to **Start → Programs → SPAWNAR** (or the name that you choose) or double click on the program icon if you copied it to your desktop. It is important to note that the two databases associated with the program MUST be located in the same directory as the program, or the program will not function properly. (Upon installation, the setup files will put the databases and the program in the same directory automatically.)

3.2 The File Menu

3.2.1 Analyzing the Data –

(Note: This section does not apply to the web version of the program)

After the connection is established with the database, the information in the BeachSurvey database can then be analyzed. After selecting the "Analyzed Data" option from the file menu, you will be prompted to enter the year of the data that you wish to analyze. (If that year's data has already been analyzed, you will be given the option of whether to re-analyze the data.) Before the data can be fully analyzed, the lunar period date will need to be entered. A form will be displayed allowing for the entry of the dates, which are to be entered in a MM/DD/YY format. It is important to note that the date ranges should be at least 7 days. The beginning date should be one day prior to the first observation for that lunar period and the ending date should be one day later than the last observation day for that lunar period. For example, if the observation days for the first lunar period in 2005 were 5/6, 5/8, and 5/10, the date range to be entered should be 05/05/05 – 05/11/05. At least 4 lunar period dates are needed. After entering the dates, press 'Continue'.

A form for entering the beach lengths will then be displayed. By default, all lengths listed on the form will be the previous year's lengths. Make corrections as necessary, and then press 'Update'. Once the 'Continue' button is enabled, press it to continue the analyzing process.

A third form will be displayed allowing for the changing of several program constant variables. It is recommended that these values not be changed from the pre-set values. Press 'Submit' to enter the values into the database. Then press 'Continue' to continue the analyzation.

The full analyzation process will now begin. (If re-analyzing previous year's data, the above steps of entering the lunar periods, beach lengths, and program constants will not be necessary). You will be prompted for the earliest and latest lunar period you wish to analyze. For example, most years will have a beginning lunar period of 1, and an ending lunar period of 4. No more than 4 lunar periods can be analyzed.

The program will generate a listing of dates where the beach surveys were cancelled. If this listing seems to be correct, click the 'Close' button to continue. Otherwise, select the checkbox in front of the date to indicate that the survey was conducted, but no crabs where found. Similarly, a list of dates will be displayed where the program determines that no crabs where found. If any of those dates where actually cancelled, check the appropriate boxes before pressing the 'Close' button to continue.

The final stages of the analyzing process will then be conducted. A message will alert you that all of the data has been calculated and stored in the database.

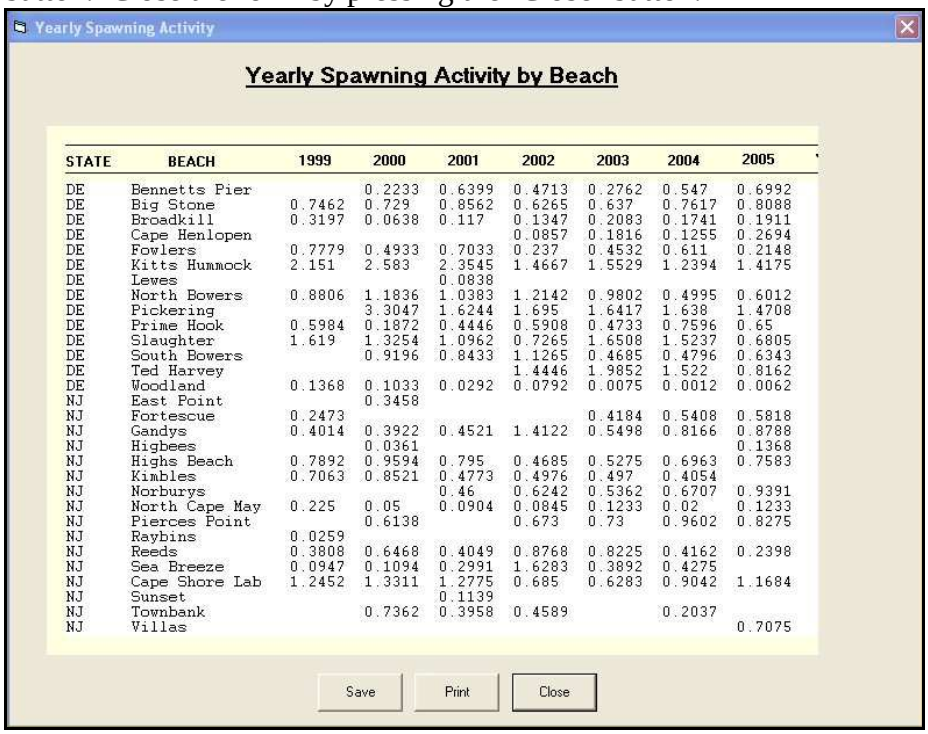
3.2.2 Exiting the Program -- Terminates the Program

3.3 The Reports Menu

3.3.1 Beach by Year -- Shows the index of spawning activity (ISA) for each beach for the selected year(s).

After choosing the Beach by Year option, select the year(s) of interest from the Year listbox. To select multiple years, press the "Ctrl" key on the keyboard, then click each year separately. Press 'Select' to view the data for the selected years.

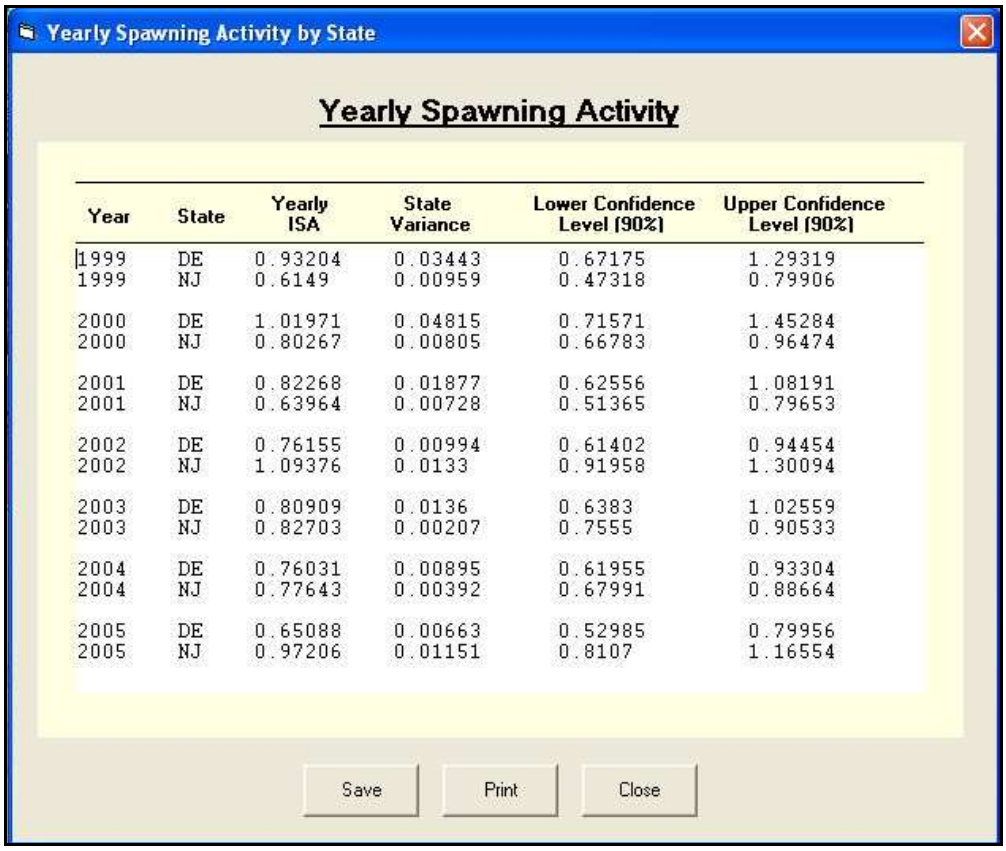
Depending on which years are selected, a form similar to the one below will be displayed. To save the information in a text format (.txt), press the 'Save' button on the bottom of the form. Navigate to the folder to which you want the file saved, and then give it an appropriate name. To print the form, select the 'Print' button. Close the form by pressing the 'Close' button.



STATE	BEACH	1999	2000	2001	2002	2003	2004	2005
DE	Bennetts Pier		0.2233	0.6399	0.4713	0.2762	0.547	0.6992
DE	Big Stone	0.7462	0.729	0.8562	0.6265	0.637	0.7617	0.8088
DE	Broadkill	0.3197	0.0638	0.117	0.1347	0.2083	0.1741	0.1911
DE	Cape Henlopen				0.0857	0.1816	0.1255	0.2694
DE	Fowlers	0.7779	0.4933	0.7033	0.237	0.4532	0.611	0.2148
DE	Kitts Hummock	2.151	2.583	2.3545	1.4667	1.5529	1.2394	1.4175
DE	Lewes			0.0838				
DE	North Bowers	0.8806	1.1836	1.0383	1.2142	0.9802	0.4995	0.6012
DE	Pickering		3.3047	1.6244	1.695	1.6417	1.638	1.4708
DE	Prime Hook	0.5984	0.1872	0.4446	0.5908	0.4733	0.7596	0.65
DE	Slaughter	1.619	1.3254	1.0962	0.7265	1.6508	1.5237	0.6805
DE	South Bowers		0.9196	0.8433	1.1265	0.4685	0.4796	0.6343
DE	Ted Harvey				1.4446	1.9852	1.522	0.8162
DE	Woodland	0.1368	0.1033	0.0292	0.0792	0.0075	0.0012	0.0062
NJ	East Point		0.3458					
NJ	Fortescue	0.2473				0.4184	0.5408	0.5818
NJ	Gandys	0.4014	0.3922	0.4521	1.4122	0.5498	0.8166	0.8788
NJ	Higbees		0.0361					0.1368
NJ	Highs Beach	0.7892	0.9594	0.795	0.4685	0.5275	0.6963	0.7583
NJ	Kimbles	0.7063	0.8521	0.4773	0.4976	0.497	0.4054	
NJ	Norburys			0.46	0.6242	0.5362	0.6707	0.9391
NJ	North Cape May	0.225	0.05	0.0904	0.0845	0.1233	0.02	0.1233
NJ	Pierces Point		0.6138		0.673	0.73	0.9602	0.8275
NJ	Raybins	0.0259						
NJ	Reeds	0.3808	0.6468	0.4049	0.8768	0.8225	0.4162	0.2398
NJ	Sea Breeze	0.0947	0.1094	0.2991	1.6283	0.3892	0.4275	
NJ	Cape Shore Lab	1.2452	1.3311	1.2775	0.685	0.6283	0.9042	1.1684
NJ	Sunset			0.1139				
NJ	Townbank		0.7362	0.3958	0.4589		0.2037	
NJ	Villas							0.7075

3.3.2 State by Year – Displays the ISA for the states of New Jersey and Delaware for the selected year(s).

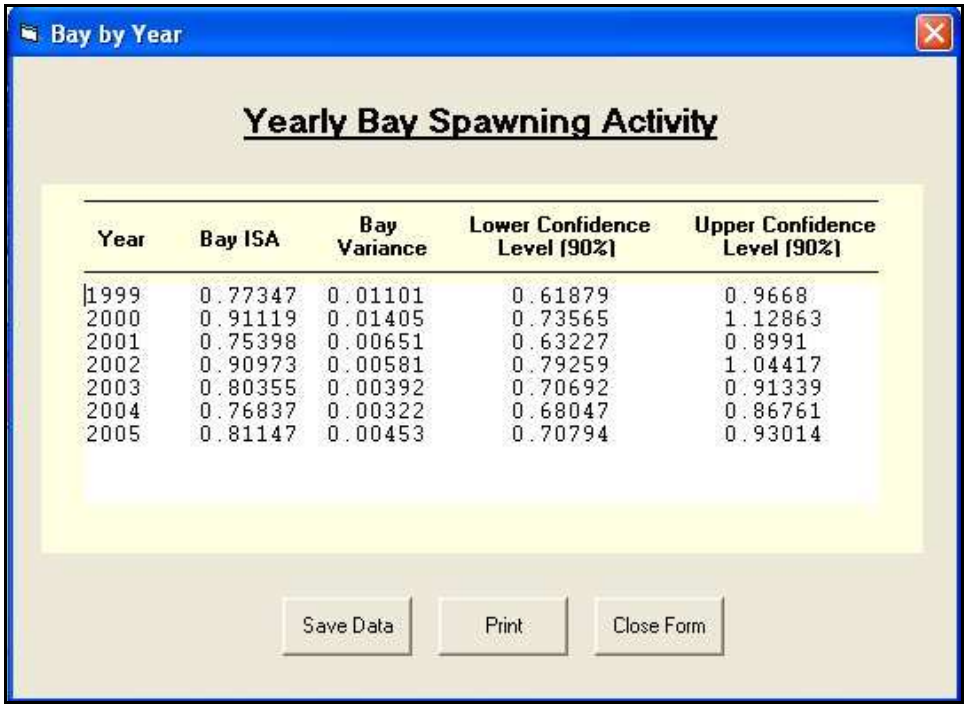
After choosing the State by Year option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years. Depending on which years are selected, a form similar to the one below will be displayed. To save the information in a text format (.txt), press the 'Save' button on the bottom of the form. Navigate to the folder to which you want the file saved, and then give it an appropriate name. To print the form, select the 'Print' button. Close the form by pressing the 'Close' button.



3.3.3 Bay by Year -- Displays the ISA for the entire bay for the selected year(s).

After choosing the Bay by Year option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years.

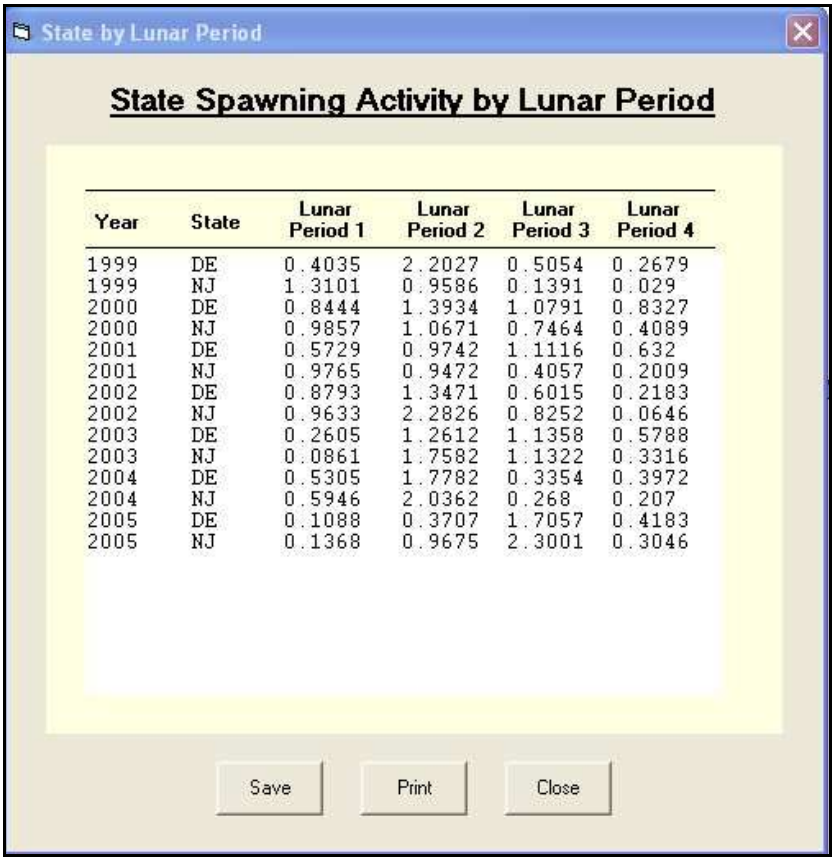
Depending on which years are selected, a form similar to the one below will be displayed. To save the information in a text format (.txt), press the 'Save Data' button on the bottom of the form. Navigate to the folder to which you want the file saved, and then give it an appropriate name. To print the form, select the 'Print' button. Close the form by pressing the 'Close' button.



3.3.4 State by Lunar Period -- Displays the ISA information for both Delaware and New Jersey by the lunar period for the selected year(s). Lunar period is the 5 day period centered on the new or full moons during the spawning season. For each year the lunar periods are numbered sequentially beginning with the first lunar period in May.

After choosing the State by Lunar option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years.

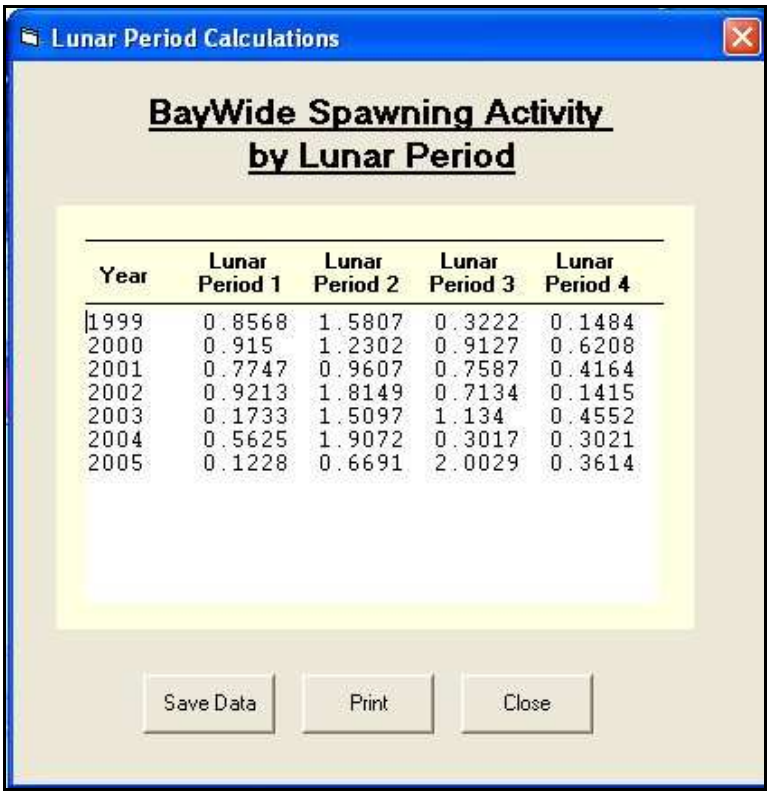
Depending on which years are selected, a form similar to the one below will be displayed. To save the data in a text format (.txt), press the 'Save' button under the table. Navigate to the folder to which you want the file saved, and then give it an appropriate name. To print the form, select the 'Print' button. Close the form by pressing the 'Close' button.



3.3.5 Bay by Lunar Period -- Displays the bay-wide ISA information by each lunar period for the selected year(s).

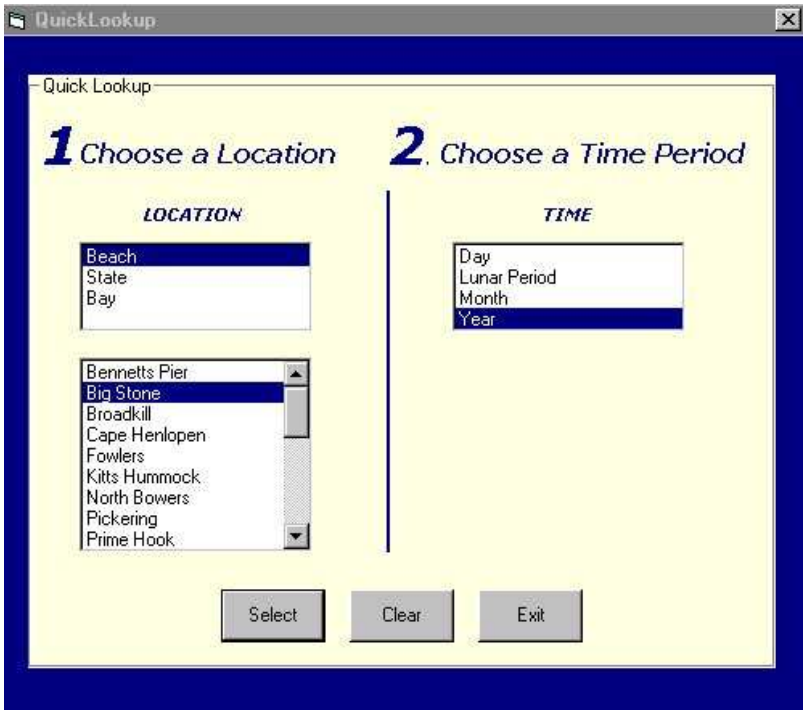
After choosing the Bay by Lunar option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years.

Depending on which years are selected, a form similar to the one below will be displayed. To save the information in a text format (.txt), press the 'Save Data' button on the bottom of the form. Navigate to the folder to which you want the file saved, and then give it an appropriate name. To print the form, select the 'Print' button. Close the form by pressing the 'Close' button.



3.3.6 Quick look up – Provides a quick resource for finding a wide range of information on the fly.

After selecting the Quick Look-up option, a form similar to the one below will be displayed. This form allows for the searching of information across both a location (beach, state, or bay) and time period (day, lunar period, month, and year).



Upon entering this form, only the top box under LOCATION and the top box under TIME will be viewable. If a more specific time or location is possible, a box below that will be display containing the more specific information. For example, if choosing the location of "Beach" from the location listbox, a second box will be displayed listing all of the beaches. Choose a specific beach from that list. Similarly, if choosing "State" as the location, then a box listing the states is shown. Choose a specific state. However, for the "Bay" option there is no additional specific information.

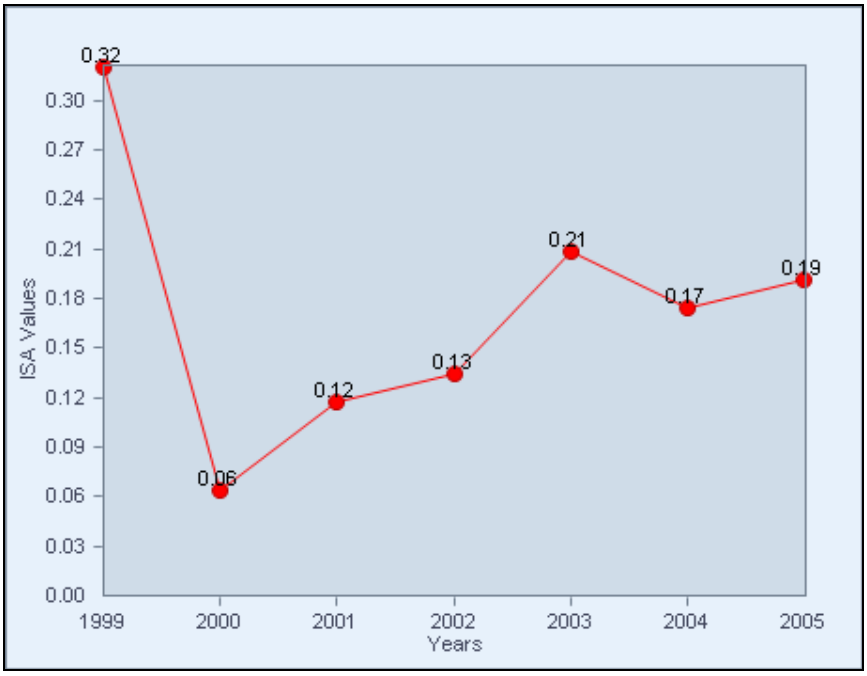
After choosing the location, select the time period for the information you wish to see. Possibilities include "Day" (only for the Beach location), "Lunar Period", "Month", and "Year". If choosing "Day", a listing of dates in which there is information for the selected location will be displayed under the time box. Click the dates of interest. If choosing "Lunar Period", an additional box listing the lunar periods is displayed. Similarly, selecting "Month" will list the possible months (either "1" for May, or "2" for June). However, the "Year" option has no additional information. All year information that is in the database will be returned if selecting this option

After selecting the location and time period, press the 'Select' Button at the bottom of the form. A message box will appear on the screen with the information that has been requested. Press "OK" to close the message box. To clear the form and perform another search, press the 'Clear' button on the form. To exit the form and return to the main program, press 'Exit'.

3.4 The Graph Menu

3.4.1 Beach by Year– Displays a graph of a beaches' ISA

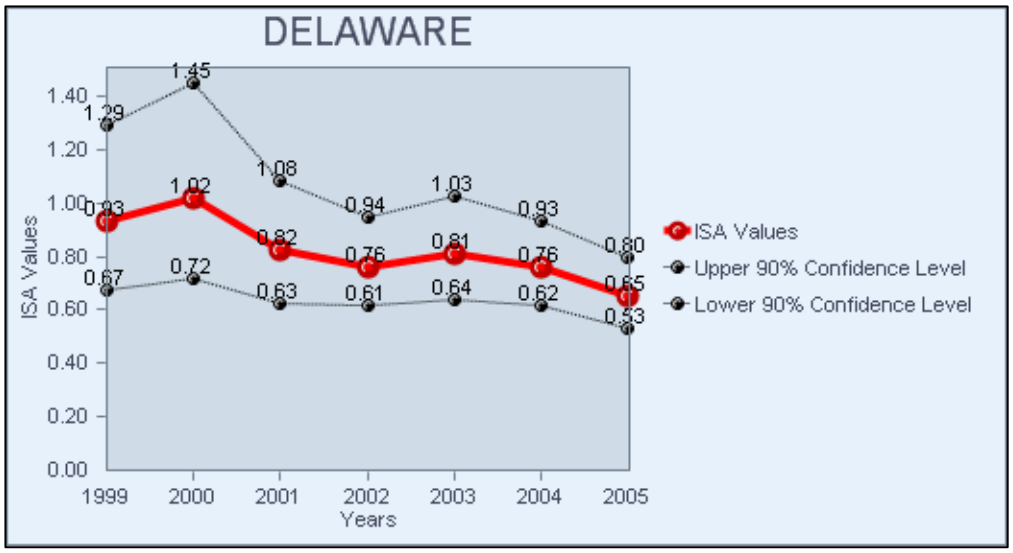
After choosing the Beach by Year option, select the specific beach of interest from the listbox. Only one beach is allowed to be viewed at a time. After selecting a beach, a graph similar to the one below will be displayed. The graph will chart the ISA's for each year that is in the database. For example, The Broadkill ISA values are charted below. The red dot indicates the actual ISA value.



To save the graph, select the 'Save Chart' option button from the File menu located on the graph. Navigate to the location you wish to save the graph, give to graph a name, and save it. To print the graph, select 'Print' from the File menu. The point labels for each of the ISAs can be turned on and off by right-clicking on the graph, and selecting the "Point Labels" option. Otherwise, to close the graph and return to the main program screen, press 'Exit Graph Screen' at the top left of the form.

3.4.2 State by Year -- Displays a graph of state-specific ISAs, upper confidence interval, and lower confidence interval by selected years.

After choosing the State by Year option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years.
After selecting a year, a form similar to the one below will be displayed. There are two graphs on the form—one showing the ISA information for Delaware and another showing the ISA information for New Jersey. The ISA for a given year is marked by a read dot, and are connected with a red line. The upper and lower 90% confidence intervals are marked with a black dotted line.

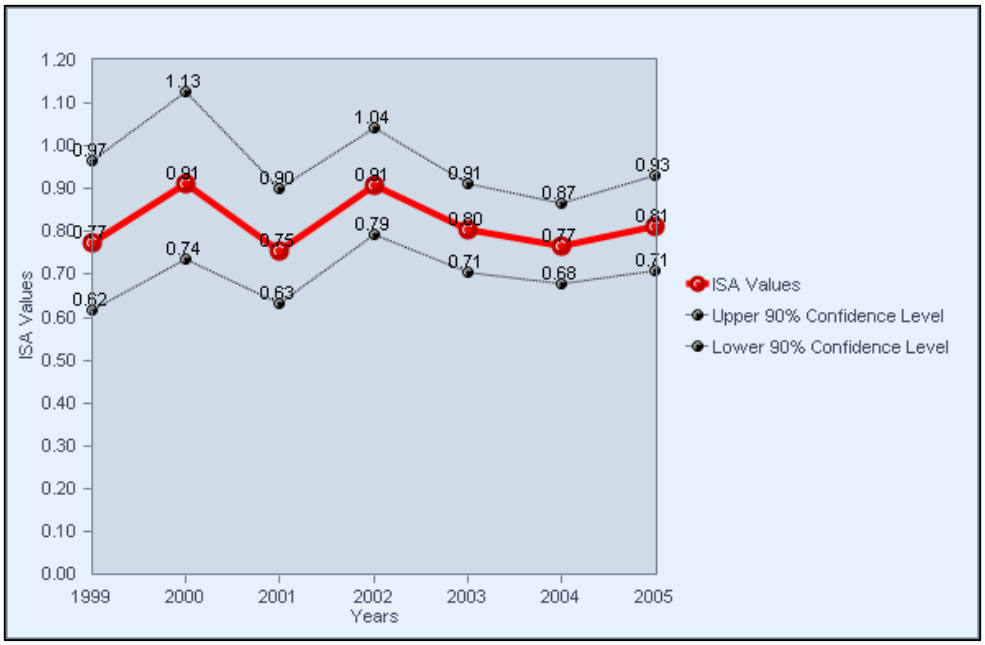


To save the graph, select the 'Save Chart' option button from the File menu located on the graph. Navigate to the location you wish to save the graph, give to graph a name, and save it. To print the graph, select 'Print' from the File menu. The point labels for each of the ISAs can be turned on and off by right-clicking on the graph, and selecting the "Point Labels" option. Otherwise, to close the graph and return to the main program screen, press 'Exit Graph Screen' at the top left of the form.

3.4.3 Bay by Year -- Displays a graph of bay-specific ISA, upper confidence interval, and lower confidence interval by a selected year

After choosing the Bay by Year option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years.

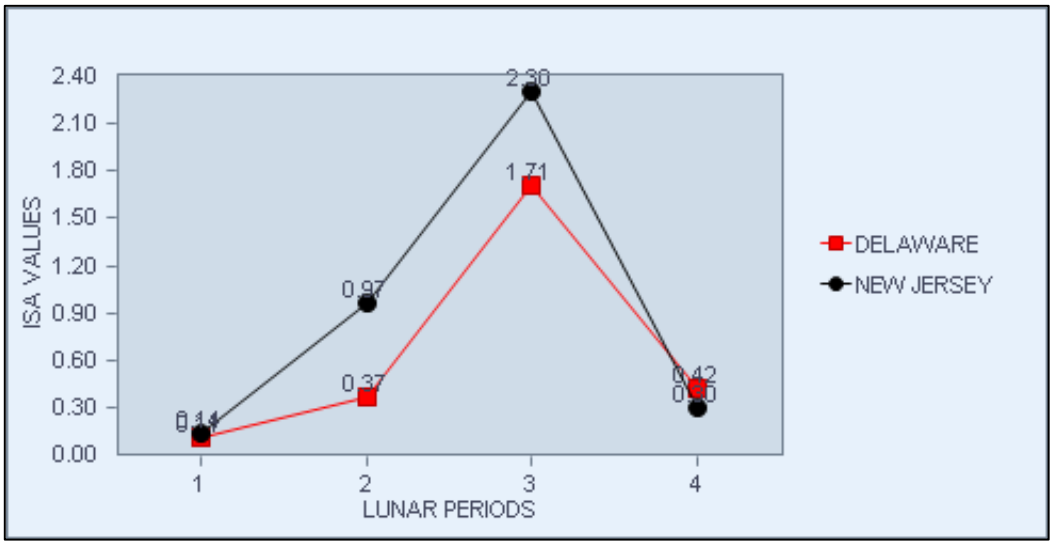
After selecting the year(s), a graph similar to the one below will be displayed. The ISA for a given year is marked by a read dot, and are connected with a red line. The upper and lower confidence intervals are marked with a black dot, and are connected with a black dotted line.



To save the graph, select the 'Save Chart' option button from the File menu located on the graph. Navigate to the location you wish to save the graph, give to graph a name, and save it. To print the graph, select 'Print' from the File menu. The point labels for each of the ISAs can be turned on and off by right-clicking on the graph, and selecting the "Point Labels" option. Otherwise, to close the graph and return to the main program screen, press 'Exit Graph Screen' at the top left of the form.

3.4.4 State by Lunar Period -- Displays a graph of the state-specific ISA by lunar period according to a selected year.

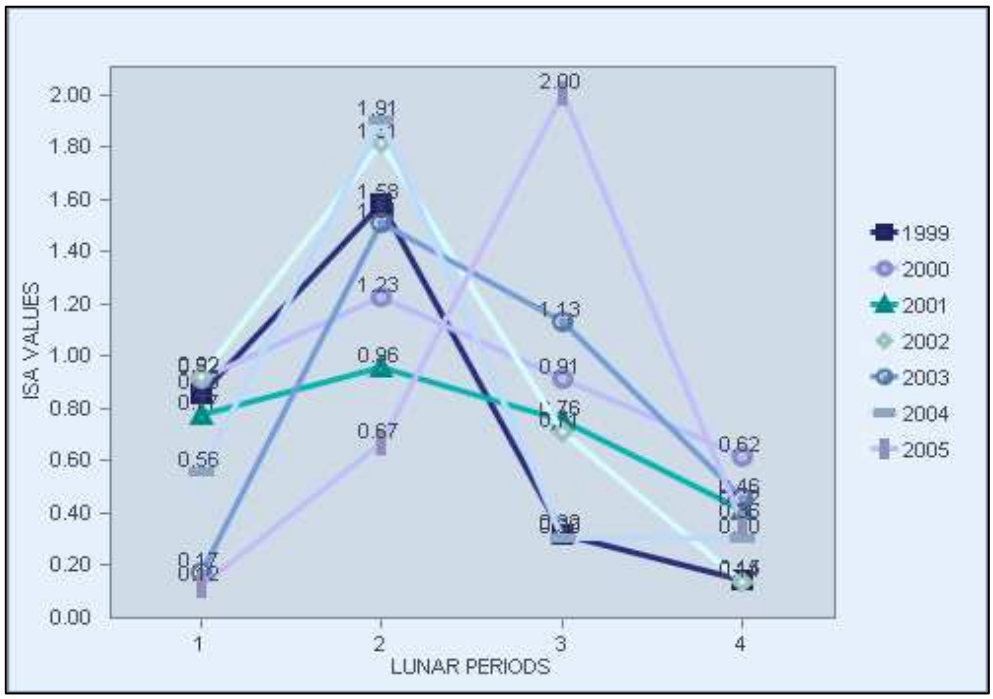
After choosing the State by Lunar Period option, select the year of interest from the Year listbox. For this graph, only one year can be viewed at a time After selecting a year, a new form window will be displayed. There are two graphs on the form—one showing the ISA by Lunar Period Number, and a second showing the ISA for the day within May and June corresponding to the new or full moon. (For example, if for Lunar Period 1 the new or full moon was on May 16th, the bottom graph will plot the ISA for the 16th day). The Lunar period graph for 2005 is shown below.



To save the graph, select the 'Save Chart' option button from the File menu located on the graph. Navigate to the location you wish to save the graph, give to graph a name, and save it. To print the graph, select 'Print' from the File menu. The point labels for each of the ISAs can be turned on and off by right-clicking on the graph, and selecting the "Point Labels" option. Otherwise, to close the graph and return to the main program screen, press 'Exit Graph Screen' at the top left of the form.

3.4.5 Bay by Lunar Period -- Displays a graph of the bay-specific ISA by lunar period according to a selected year.

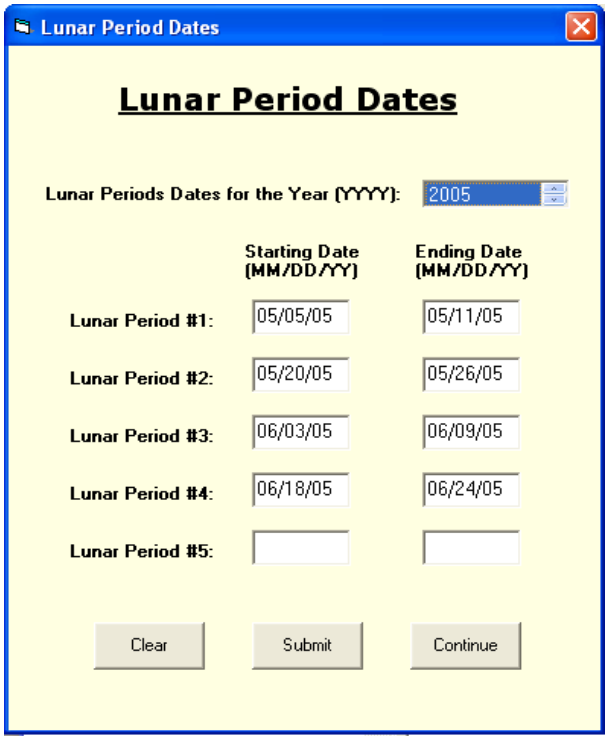
After choosing the Bay by Lunar Period option, select the year(s) of interest from the Year listbox. To select multiple years, press "Ctrl", then click each year separately. Press 'Select' to view the data for the selected years.



After selecting the year(s), a form similar to the one above will be displayed. To save the graph, select the 'Save Chart' option button from the File menu located on the graph. Navigate to the location you wish to save the graph, give to graph a name, and save it. To print the graph, select 'Print' from the File menu. The point labels for each of the ISAs can be turned on and off by right-clicking on the graph, and selecting the "Point Labels" option. Otherwise, to close the graph and return to the main program screen, press 'Exit Graph Screen' at the top left of the form.

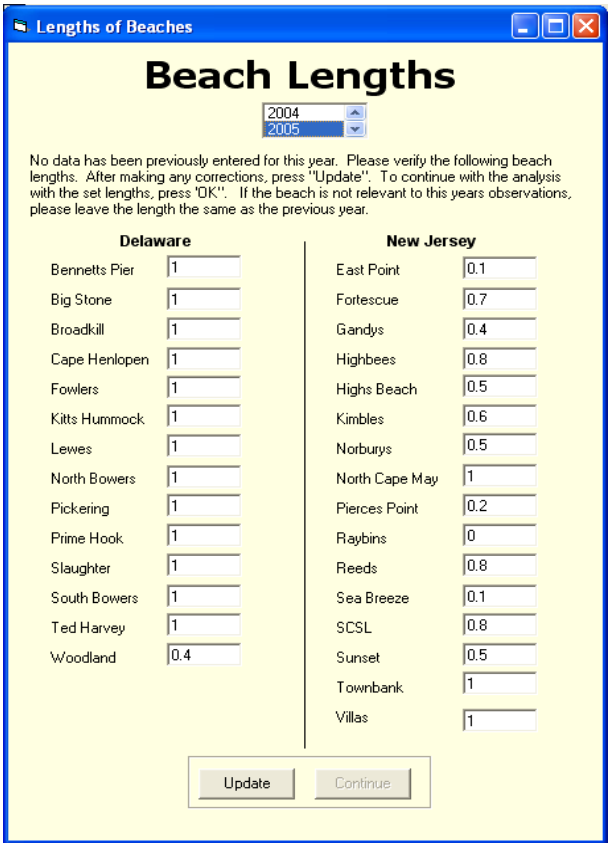
3.5 The Edit Menu

3.5.1 Updating the Lunar Period Dates --



This allows for the updating of the lunar period dates used for each year. The dates are to be entered in a MM/DD/YY format. It is important to note that the date ranges should be at least 7 days. The beginning date should be one day prior to the first observation for that lunar period and the ending date should be one day later than the last observation day for that lunar period. For example, if the observation days for the first lunar period in 2005 were 5/6, 5/8, and 5/10, the date range to be entered should be 05/05/05 – 05/11/05. When running the analysis for a new year, you will be prompted to enter the dates for the lunar periods. All previous years dates can be edited using the drop down list box. Select a year, enter/update the dates, and press 'Submit'.

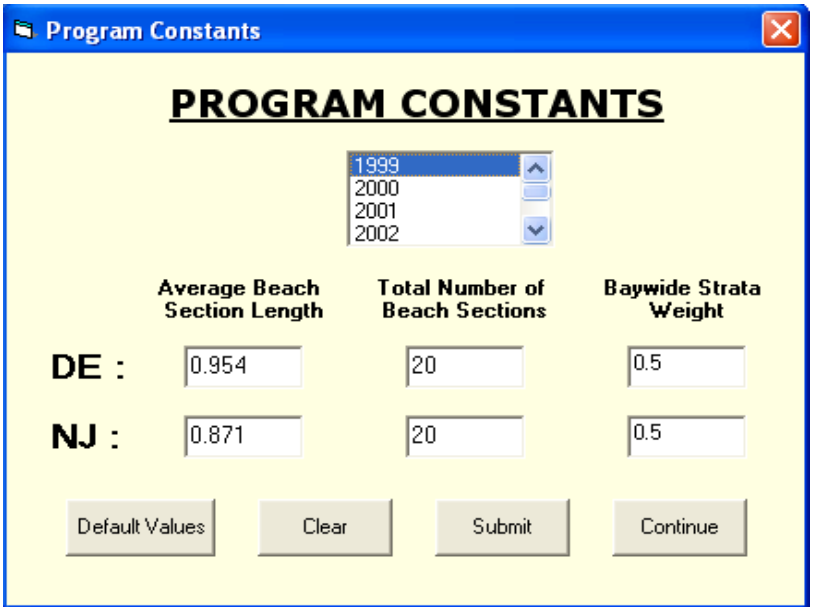
3.5.2 Updating the Beach Lengths --



This allows for the updating of the each of the beach, for each year. When running the analysis for a new year, you will be prompted to validate the lengths for the year you are running. The default lengths listed will be the lengths for the previous year. Change the lengths as necessary. To enter the information, select 'Update'. All previous years dates can be edited using the drop down list box. Select a year, change the lengths as necessary, and then press 'Update'.

3.5.3 Updating the Program constants –

This allows for the updating of the constant variables used in the program. For example, the beach length, total beach sections, and the bay wide strata length can be updated for both NJ and DE for each year. When running the analysis for a new year, you will be prompted to confirm the pre-set values. It is recommended that the default values be used. All previous years' data can be edited using the drop down list box. Select a year, update the dates, then press 'Submit'.



Appendix A – Shortcut Items/Menu Structure

File Menu

Task	Short Cut	Navigation of Menu
Analyzing data for a specific year	Ctrl + A	File → Analyze Data
Exiting and Closing the Program	Ctrl + X	File → Exit

Reports Menu

Task	Short Cut	Navigation of Menu
Viewing the beach level data by year	F1	Reports → Beach By Year
Viewing the state level data by year	F2	Reports → State By Year
Viewing the bay level data by year	F3	Reports → Bay By Year
Viewing the state level data by lunar period	F4	Reports → State By Lunar Period
Viewing the bay level data by lunar period	F5	Reports → Bay By Lunar Period
Viewing the quick look-up table	F6	Reports → Quick Lookup

Graphs Menu

Task	Short Cut	Navigation of Menu
Viewing the beach level graph by year	Ctrl + F1	Graphs → Beach By Year
Viewing the state level graph by year	Ctrl + F2	Graphs → State By Year
Viewing the bay level graph by year	Ctrl + F3	Graphs → Bay By Year
Viewing the state level graph by lunar period	Ctrl + F4	Graphs → State By Lunar Period
Viewing the bay level graph by lunar period	Ctrl + F5	Graphs → Bay By Lunar Period

Edit Menu

Task	Short Cut	Navigation of Menu
Updating the lunar period dates	Ctrl + L	Edit → Update Lunar Period Dates
Updating the beach lengths	Ctrl + B	Edit → Update Beach Lengths
Updating the program constant variables	Ctrl + E	Edit → Update Program Constants